# Work Order ID 102862

*102862*



*June-12-13 9:15:38 AM*

**Item ID:** D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*

**Revision ID:** **Stop** *NS2*

**Item Name:** Crosstube Aft

**Start Date:** 6/17/13 **Start Qty:** 1.00 *1*

**Required Date:** 6/17/13 **Req'd Qty:** 1.00 *1*

**Reference:**

**Cust Item ID:**

**Customer:**

**Run Start** *NR1*

**Stop** *NR2*

**Approvals:** **Process Plan:** MCS **Date:** 13-06-14 **Tooling:** _____ **Date:** _____

**QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|---|---|---|---|---|---|---|---|---|---|
| **Draw Nbr** | **Revision Nbr** | | | | | | | | |
| D412-664-243 | E/DEO | | | | | | | | |
| 100 | | 0.00 | | | | | | | |
| *100* | DOCUMENT CONTROL | | | | | | | | |
| DC | **Memo** N.A. | 0.00 | | | | | | | |
| Document Control | Photocopy bluefile and create labels as per PPP D412-664-203 CHG 009 | | | | | | | | |
| 110 | | 0.00 | | | | | | | |
| *110* | Packaging | | | | | | | | |
| Packaging | **Memo** | 0.00 | | | | | | | |
| Packaging | | | | | | | | | |
| 120 | | 0.00 | | | | | | | |
| *120* | BENDING MACHINE - CROSSTUBES | | | | | | | | |
| CNC Bend 2 | **Memo** | 0.00 | | | | | | | |
| CNC Alpha 160 Bender | Bend tube as per Dwg D412-664-243 using CNC bender program 412-aft and Folio FT010 | | | | | | | | |

Smb B 9s

13-08-16

Pho →

13-08-16

DQA: [signature] Date: 13/09/17

QA Closed: [signature] Date: 13/9/13

# WORK ORDER NON-CONFORMANCE / UPDATE

DART AEROSPACE

Work Order update only ☐

Work Order: 102862

Part No. D412-664-203

NCR No. 13-3016

**DISPOSITION**

| | |
|---|---|
| Rework | ☐ |
| Scrap | ☐ |
| Use-as-is | X |
| Suspected Unapproved | ☐ |

**AGAINST DEPARTMENT/PROCESS**

| | | | | | |
|---|---|---|---|---|---|
| Skid-tube | ☐ | Crosstube | X | Water Jet | ☐ |
| Machining | ☐ | Small Fab | ☐ | Prod. Eng. Coor. | ☐ |
| Thermoforming | ☐ | Finishing | ☐ | Rec/Store/Packaging | ☐ |
| Large Fab | ☐ | Composite | ☐ | Supplier | ☐ |

| Engineering | ☐ |
|---|---|
| Quality | ☐ |
| Other | ☐ |
| | ☐ |

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | | 13/8/16 | 120 | 1 | CRUSHING IS OVER TOLERANCE. | [signature] 13/8/16 | Acceptable per attached S.R. | [signature] 13/8/16 | DAS 16 9-89 | DAS 16 9-89 |
| Doc/Data | | | | | | | | | | |
| Equip/Tooling | | | | | | | | | | |
| Handling/Pre | | | | | | | | | | |
| Material | | | | | | | | | | |
| Operator | | | | | | | | | | |
| Offset/Setup | | | | | | | | | | |
| Process | X | | | | RC. Process | | | | 13/06/19 | 13/06/19 |
| Supplier | | | | | | | | | | |
| Training | | | | | | | | | | |
| Transport | | | | | | | | | | |
| Unapproved | | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

| | |
|---|---|
| [f] | Bending |
| | Centre Not Concentric |
| | Cracks |
| | Crimp/Kink/Ripple/Wave |
| | Cuffs |
| | Crushing |
| | Heat Treat |
| | Inspection Strip in Tube |
| | Marks/Chatter |
| | Turning Sequence |
| | Wave/Twist in Tube |

**General**

| | |
|---|---|
| ☐ | Bend |
| ☐ | BOM/Route |
| ☐ | Broken/Damage/Defect |
| ☐ | Burrs |
| ☐ | Contamination |
| ☐ | Countersink |
| ☐ | Cut Too Short |
| ☐ | Drawing |
| ☐ | Drill Holes |
| ☐ | Finish |
| ☐ | Fit/Function |

| | |
|---|---|
| ☐ | Folio/Program |
| ☐ | Grain |
| ☐ | Hardware |
| ☐ | Inspection Incomplete/Unqualified |
| ☐ | Instructions Incomplete/Unclear |
| ☐ | Misaligned/off center |
| ☐ | Mislabeled |
| ☐ | Misread |
| ☐ | Off-set |
| ☐ | Out of Calibration |
| ☐ | Out of Sequence |

| | |
|---|---|
| ☐ | Outside Dimensions |
| ☐ | Over/Under tolerance |
| ☐ | Part Incorrect |
| ☐ | Part Lost/Missing |
| ☐ | Part Moved |
| ☐ | Positioned Wrong |
| ☐ | Power Loss/Surge |

| | |
|---|---|
| ☐ | Pressure/Forced |
| ☐ | Set-up |
| ☐ | Temperature/Cure |
| ☐ | Weld |
| ☐ | Wrong Stock Pulled |
| ☐ | Other |

**Item ID:** D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*
**Revision ID:** **Stop** *NS2*
**Item Name:** Crosstube Aft

**Start Date:** 6/17/13 **Start Qty:** 1.00 *1* **Cust Item ID:**
**Required Date:** 6/17/13 **Req'd Qty:** 1.00 *1* **Customer:**
**Reference:**

**Run Start** *NR1*
**Stop** *NR2*

**Approvals:** **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
**QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|---|---|---|---|---|---|---|---|---|---|
| 130 | QC15- Crosstube Dimensional Check | 0.00 | DAS 16 9-89 13/08/19 | | | | | | |
| *130* | | | | | | | | | |
| QC | **Memo** | 0.00 | | | | | | | |
| Quality Control | | | | | | | | | |
| 140 | | 0.00 | | | | | | | |
| *140* | Crosstubes | | | | | | | | |
| Crosstubes | **Memo** | 0.00 | | | | | | | |
| Crosstubes | 1-Drill pilot holes in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551and drill table DT8577 using #9 holes as per QSI 10 to install towers. | | | | | | | | |
| | 2-Ream hole to finish size in tube as per Dwg D412-664-243using drill Jig DT8550 & DT8551.Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes. | | | | | | | | |
| | 3-SCRIBE PART # & BATCH # | | | | | | | | |
| | 4- *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243 | | | | | | | | |

13-08-19

13-08-20

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

DART AEROSPACE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

| | |
|---|---|
| Rework | ☐ |
| Scrap | ☐ |
| Use-as-is | ☐ |
| Suspected Unapproved | ☐ |

**AGAINST DEPARTMENT/PROCESS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Skid-tube | ☐ | Crosstube | ☐ | Water Jet | ☐ | Engineering | ☐ |
| Machining | ☐ | Small Fab | ☐ | Prod. Eng. Coor. | ☐ | Quality | ☐ |
| Thermoforming | ☐ | Finishing | ☐ | Rec/Store/Packaging | ☐ | Other | ☐ |
| Large Fab | ☐ | Composite | ☐ | Supplier | ☐ | | ☐ |

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

| | |
|---|---|
| ☐ | Bending |
| ☐ | Centre Not Concentric |
| ☐ | Cracks |
| ☐ | Crimp/Kink/Ripple/Wave |
| ☐ | Cuffs |
| ☐ | Crushing |
| ☐ | Heat Treat |
| ☐ | Inspection Strip in Tube |
| ☐ | Marks/Chatter |
| ☐ | Turning Sequence |
| ☐ | Wave/Twist in Tube |

**General**

| | |
|---|---|
| ☐ | Bend |
| ☐ | BOM/Route |
| ☐ | Broken/Damage/Defect |
| ☐ | Burrs |
| ☐ | Contamination |
| ☐ | Countersink |
| ☐ | Cut Too Short |
| ☐ | Drawing |
| ☐ | Drill Holes |
| ☐ | Finish |
| ☐ | Fit/Function |

| | |
|---|---|
| ☐ | Folio/Program |
| ☐ | Grain |
| ☐ | Hardware |
| ☐ | Inspection Incomplete/Unqualified |
| ☐ | Instructions Incomplete/Unclear |
| ☐ | Misaligned/off center |
| ☐ | Mislabeled |
| ☐ | Misread |
| ☐ | Off-set |
| ☐ | Out of Calibration |
| ☐ | Out of Sequence |

| | |
|---|---|
| ☐ | Outside Dimensions |
| ☐ | Over/Under tolerance |
| ☐ | Part Incorrect |
| ☐ | Part Lost/Missing |
| ☐ | Part Moved |
| ☐ | Positioned Wrong |
| ☐ | Power Loss/Surge |

| | |
|---|---|
| ☐ | Pressure/Forced |
| ☐ | Set-up |
| ☐ | Temperature/Cure |
| ☐ | Weld |
| ☐ | Wrong Stock Pulled |
| ☐ | Other |

_____

_____

_____

**Item ID:** D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*
**Revision ID:** **Stop** *NS2*
**Item Name:** Crosstube Aft
**Start Date:** 6/17/13 **Start Qty:** 1.00 *1* **Cust Item ID:**
**Required Date:** 6/17/13 **Req'd Qty:** 1.00 *1* **Customer:**
**Reference:**

**Run Start** *NR1*
**Stop** *NR2*

**Approvals:** **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
**QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|---|---|---|---|---|---|---|---|---|---|
| 160 | QC5- Inspect part completeness to step on W/O | 0.00 | DAS 27 9-89 | | | 1 | | | |
| *160* | | | | | | | | | |
| QC | **Memo** | 0.00 | | | | | | | |
| Quality Control | *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** | | 13 & 20 | | | | | | |
| 170 | | 0.00 | | | | | | | |
| *170* | | | | | | 1 | 0 | 0 | AB 13-8-22 |
| HandFXtube | **Memo** | 0.00 | | | | | | | |
| Hand Finishing Crosstubes | *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** | | | | | | | | |
| | 1- CLEAN CROSSTUBE WITH WASH'N WIPE | | | | | | | | |
| 180 | Outsource process - NDT per QSI038 4.1 | 0.00 | | | | CL 13/08/22 | | | |
| *180* | | | | | | | | | |
| Outsource2 | **Memo** | 0.00 | | | | | | | |
| Outsource process - NDT | *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** | | | | | | | | |
| | Liquid Penetrant Inspection as per QSI 038Or<br>Issue P/O: 21040 LPI as per ASTM 1417<br>Level 2 Attach copy of NDT results to work order | | | | | | | | |

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

DART AEROSPACE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

| | |
|---|---|
| Rework | ☐ |
| Scrap | ☐ |
| Use-as-is | ☐ |
| Suspected Unapproved | ☐ |

**AGAINST DEPARTMENT/PROCESS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Skid-tube | ☐ | Crosstube | ☐ | Water Jet | ☐ | Engineering | ☐ |
| Machining | ☐ | Small Fab | ☐ | Prod. Eng. Coor. | ☐ | Quality | ☐ |
| Thermoforming | ☐ | Finishing | ☐ | Rec/Store/Packaging | ☐ | Other | ☐ |
| Large Fab | ☐ | Composite | ☐ | Supplier | ☐ | | ☐ |

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

| | |
|---|---|
| ☐ | Bending |
| ☐ | Centre Not Concentric |
| ☐ | Cracks |
| ☐ | Crimp/Kink/Ripple/Wave |
| ☐ | Cuffs |
| ☐ | Crushing |
| ☐ | Heat Treat |
| ☐ | Inspection Strip in Tube |
| ☐ | Marks/Chatter |
| ☐ | Turning Sequence |
| ☐ | Wave/Twist in Tube |

**General**

| | |
|---|---|
| ☐ | Bend |
| ☐ | BOM/Route |
| ☐ | Broken/Damage/Defect |
| ☐ | Burrs |
| ☐ | Contamination |
| ☐ | Countersink |
| ☐ | Cut Too Short |
| ☐ | Drawing |
| ☐ | Drill Holes |
| ☐ | Finish |
| ☐ | Fit/Function |
| ☐ | Folio/Program |
| ☐ | Grain |
| ☐ | Hardware |
| ☐ | Inspection Incomplete/Unqualified |
| ☐ | Instructions Incomplete/Unclear |
| ☐ | Misaligned/off center |
| ☐ | Mislabeled |
| ☐ | Misread |
| ☐ | Off-set |
| ☐ | Out of Calibration |
| ☐ | Out of Sequence |
| ☐ | Outside Dimensions |
| ☐ | Over/Under tolerance |
| ☐ | Part Incorrect |
| ☐ | Part Lost/Missing |
| ☐ | Part Moved |
| ☐ | Positioned Wrong |
| ☐ | Power Loss/Surge |
| ☐ | Pressure/Forced |
| ☐ | Set-up |
| ☐ | Temperature/Cure |
| ☐ | Weld |
| ☐ | Wrong Stock Pulled |
| ☐ | Other |

_____

_____

_____

**Item ID:** D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*
**Revision ID:** **Stop** *NS2*
**Item Name:** Crosstube Aft
**Start Date:** 6/17/13 **Start Qty:** 1.00 *1* **Cust Item ID:**
**Required Date:** 6/17/13 **Req'd Qty:** 1.00 *1* **Customer:**
**Reference:**

**Run Start** *NR1*
**Stop** *NR2*

**Approvals:** **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
**QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|---|---|---|---|---|---|---|---|---|---|
| 190 | | 0.00 | | | | | | | |
| *190* | Packaging | | | | | 1X | | | SP |
| Packaging | **Memo** | 0.00 | | | | | | | 13-8-22 |
| Packaging | *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** | | | | | | | | |
| | Inspect for transit damage<br>Ensure copy of NDT results attached to work order. | | | | | | | | |
| 200 | QC5- Inspect part completeness to step on W/O | 0.00 | DAS 27 9-89 | | | 1 | | | |
| *200* | | | 13-8-22 | | | | | | |
| QC | **Memo** | 0.00 | | | | | | | |
| Quality Control | *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** | | | | | | | | |
| | Inspect for damage & ensure results are as per Dwg D412-664-203 | | | | | | | | |
| 203 | | 0.00 | | | | | | | |
| *203* | | | | | | 1 | Ø | Ø | AP |
| HandFXtube | **Memo** | 0.00 | | | | | | | 13-8-22 |
| Hand Finishing Crosstubes | *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** | | | | | | | | |
| | 1- PRESSURE WASH AND THEN USE WASH'N WIPE TO CLEAN CROSSTUBE BEFORE CHEMICAL CONVERSION | | | | | | | | |

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

DART AEROSPACE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

- Rework ☐
- Scrap ☐
- Use-as-is ☐
- Suspected Unapproved ☐

**AGAINST DEPARTMENT/PROCESS**

- Skid-tube ☐
- Machining ☐
- Thermoforming ☐
- Large Fab ☐
- Crosstube ☐
- Small Fab ☐
- Finishing ☐
- Composite ☐
- Water Jet ☐
- Prod. Eng. Coor. ☐
- Rec/Store/Packaging ☐
- Supplier ☐
- Engineering ☐
- Quality ☐
- Other ☐

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

- ☐ Bending
- ☐ Centre Not Concentric
- ☐ Cracks
- ☐ Crimp/Kink/Ripple/Wave
- ☐ Cuffs
- ☐ Crushing
- ☐ Heat Treat
- ☐ Inspection Strip in Tube
- ☐ Marks/Chatter
- ☐ Turning Sequence
- ☐ Wave/Twist in Tube

**General**

- ☐ Bend
- ☐ BOM/Route
- ☐ Broken/Damage/Defect
- ☐ Burrs
- ☐ Contamination
- ☐ Countersink
- ☐ Cut Too Short
- ☐ Drawing
- ☐ Drill Holes
- ☐ Finish
- ☐ Fit/Function
- ☐ Folio/Program
- ☐ Grain
- ☐ Hardware
- ☐ Inspection Incomplete/Unqualified
- ☐ Instructions Incomplete/Unclear
- ☐ Misaligned/off center
- ☐ Mislabeled
- ☐ Misread
- ☐ Off-set
- ☐ Out of Calibration
- ☐ Out of Sequence
- ☐ Outside Dimensions
- ☐ Over/Under tolerance
- ☐ Part Incorrect
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- ☐ Part Moved
- ☐ Positioned Wrong
- ☐ Power Loss/Surge
- ☐ Pressure/Forced
- ☐ Set-up
- ☐ Temperature/Cure
- ☐ Weld
- ☐ Wrong Stock Pulled
- ☐ Other

_____

_____

_____

**Item ID:** D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*
**Revision ID:** **Stop** *NS2*
**Item Name:** Crosstube Aft

**Start Date:** 6/17/13 **Start Qty:** 1.00 *1* **Cust Item ID:**
**Required Date:** 6/17/13 **Req'd Qty:** 1.00 *1* **Customer:**
**Reference:**

**Run Start** *NR1*
**Stop** *NR2*

**Approvals:** **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
**QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|---|---|---|---|---|---|---|---|---|---|
| 205 | QC7-Inspect Chemical Conversion Coat | 0.00 | | | | | | | |
| *205* | | | | | | 1 | | | DAS 05 8-89 13-08-23 |
| QC | **Memo** | 0.00 | | | | | | | |
| Quality Control | *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** | | | | | | | | |

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

DART AEROSPACE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

- Rework ☐
- Scrap ☐
- Use-as-is ☐
- Suspected Unapproved ☐

**AGAINST DEPARTMENT/PROCESS**

| | | | |
|---|---|---|---|
| Skid-tube ☐ | Crosstube ☐ | Water Jet ☐ | Engineering ☐ |
| Machining ☐ | Small Fab ☐ | Prod. Eng. Coor. ☐ | Quality ☐ |
| Thermoforming ☐ | Finishing ☐ | Rec/Store/Packaging ☐ | Other ☐ |
| Large Fab ☐ | Composite ☐ | Supplier ☐ | |

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

- ☐ Bending
- ☐ Centre Not Concentric
- ☐ Cracks
- ☐ Crimp/Kink/Ripple/Wave
- ☐ Cuffs
- ☐ Crushing
- ☐ Heat Treat
- ☐ Inspection Strip in Tube
- ☐ Marks/Chatter
- ☐ Turning Sequence
- ☐ Wave/Twist in Tube

**General**

- ☐ Bend
- ☐ BOM/Route
- ☐ Broken/Damage/Defect
- ☐ Burrs
- ☐ Contamination
- ☐ Countersink
- ☐ Cut Too Short
- ☐ Drawing
- ☐ Drill Holes
- ☐ Finish
- ☐ Fit/Function
- ☐ Folio/Program
- ☐ Grain
- ☐ Hardware
- ☐ Inspection Incomplete/Unqualified
- ☐ Instructions Incomplete/Unclear
- ☐ Misaligned/off center
- ☐ Mislabeled
- ☐ Misread
- ☐ Off-set
- ☐ Out of Calibration
- ☐ Out of Sequence
- ☐ Outside Dimensions
- ☐ Over/Under tolerance
- ☐ Part Incorrect
- ☐ Part Lost/Missing
- ☐ Part Moved
- ☐ Positioned Wrong
- ☐ Power Loss/Surge
- ☐ Pressure/Forced
- ☐ Set-up
- ☐ Temperature/Cure
- ☐ Weld
- ☐ Wrong Stock Pulled
- ☐ Other

_____

_____

_____

**Item ID:** D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*
**Revision ID:** **Stop** *NS2*
**Item Name:** Crosstube Aft

**Start Date:** 6/17/13 **Start Qty:** 1.00 *1* **Cust Item ID:**
**Required Date:** 6/17/13 **Req'd Qty:** 1.00 *1* **Customer:**
**Reference:**

**Run Start** *NR1*
**Stop** *NR2*

**Approvals:** **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
**QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|---|---|---|---|---|---|---|---|---|---|
| 210 | | 0.00 | | | | | | | |
| *210* | SprayPaint | | | | | 1 | 0 | 0 | AB 13-8-28 |
| SprayPaint | **Memo** | 0.00 | | | | | | | |
| Spray Painting | *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** | | | | | | | | |

***Mask underside of crosstube as shown***

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per DEO D412-664-243 and QSI 005 4.2

PRIME: 126195
Start Time: 10:45
Fininsh Time: 11:30
PAINT: 126300
Start Time: 8:30
Finish Time: 9:15

3- Apply clear coat after paint as per DEO
120473

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

DART AEROSPACE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

- Rework ☐
- Scrap ☐
- Use-as-is ☐
- Suspected Unapproved ☐

**AGAINST DEPARTMENT/PROCESS**

| | | | |
|---|---|---|---|
| Skid-tube ☐ | Crosstube ☐ | Water Jet ☐ | Engineering ☐ |
| Machining ☐ | Small Fab ☐ | Prod. Eng. Coor. ☐ | Quality ☐ |
| Thermoforming ☐ | Finishing ☐ | Rec/Store/Packaging ☐ | Other ☐ |
| Large Fab ☐ | Composite ☐ | Supplier ☐ | ☐ |

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

- ☐ Bending
- ☐ Centre Not Concentric
- ☐ Cracks
- ☐ Crimp/Kink/Ripple/Wave
- ☐ Cuffs
- ☐ Crushing
- ☐ Heat Treat
- ☐ Inspection Strip in Tube
- ☐ Marks/Chatter
- ☐ Turning Sequence
- ☐ Wave/Twist in Tube

**General**

- ☐ Bend
- ☐ BOM/Route
- ☐ Broken/Damage/Defect
- ☐ Burrs
- ☐ Contamination
- ☐ Countersink
- ☐ Cut Too Short
- ☐ Drawing
- ☐ Drill Holes
- ☐ Finish
- ☐ Fit/Function
- ☐ Folio/Program
- ☐ Grain
- ☐ Hardware
- ☐ Inspection Incomplete/Unqualified
- ☐ Instructions Incomplete/Unclear
- ☐ Misaligned/off center
- ☐ Mislabeled
- ☐ Misread
- ☐ Off-set
- ☐ Out of Calibration
- ☐ Out of Sequence
- ☐ Outside Dimensions
- ☐ Over/Under tolerance
- ☐ Part Incorrect
- ☐ Part Lost/Missing
- ☐ Part Moved
- ☐ Positioned Wrong
- ☐ Power Loss/Surge
- ☐ Pressure/Forced
- ☐ Set-up
- ☐ Temperature/Cure
- ☐ Weld
- ☐ Wrong Stock Pulled
- ☐ Other

_____

_____

_____

**Item ID:** D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*
**Revision ID:** **Stop** *NS2*
**Item Name:** Crosstube Aft
**Start Date:** 6/17/13 **Start Qty:** 1.00 *1* **Cust Item ID:**
**Required Date:** 6/17/13 **Req'd Qty:** 1.00 *1* **Customer:**
**Reference:**

**Run Start** *NR1*
**Stop** *NR2*

**Approvals:** **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
**QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|---|---|---|---|---|---|---|---|---|---|
| 220 | QC14- Inspect Spray Paint | 0.00 | | | | | | | |
| *220* | | | | | | 0 | Ø | 13-09-05 | |
| QC | **Memo** | 0.00 | | | | | | | |
| Quality Control | Then,Wrap in plastic bag to protect from scratches | | | | | | | | |
| 230 | | 0.00 | | | | | | | |
| *230* | Crosstubes | | | | | 1 | Ø | Ø | AP 13-8-28 |
| Crosstubes | **Memo** | 0.00 | | | | | | | |
| Crosstubes | Assemble as per Dwg D412-664-203 | | | | | | | | |

1- Install chafing shield as per DEO D412-664-243.Top holes should be facing up.
A/R Proseal 890 Batch: 126010
EXP: 2/14

2- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe

3-Install support with Scotch-Weld DP460 and install clamps as per DEO Dwg D12-664-243 using installaition jig DT9024. Torque clamps as per dwg
A/R Scotch-Weld DP460 Batch: 125540
EXP: 5/14

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

DART AEROSPACE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

- Rework ☐
- Scrap ☐
- Use-as-is ☐
- Suspected Unapproved ☐

**AGAINST DEPARTMENT/PROCESS**

| | | | |
|---|---|---|---|
| Skid-tube ☐ | Crosstube ☐ | Water Jet ☐ | Engineering ☐ |
| Machining ☐ | Small Fab ☐ | Prod. Eng. Coor. ☐ | Quality ☐ |
| Thermoforming ☐ | Finishing ☐ | Rec/Store/Packaging ☐ | Other ☐ |
| Large Fab ☐ | Composite ☐ | Supplier ☐ | ☐ |

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

- ☐ Bending
- ☐ Centre Not Concentric
- ☐ Cracks
- ☐ Crimp/Kink/Ripple/Wave
- ☐ Cuffs
- ☐ Crushing
- ☐ Heat Treat
- ☐ Inspection Strip in Tube
- ☐ Marks/Chatter
- ☐ Turning Sequence
- ☐ Wave/Twist in Tube

**General**

- ☐ Bend
- ☐ BOM/Route
- ☐ Broken/Damage/Defect
- ☐ Burrs
- ☐ Contamination
- ☐ Countersink
- ☐ Cut Too Short
- ☐ Drawing
- ☐ Drill Holes
- ☐ Finish
- ☐ Fit/Function
- ☐ Folio/Program
- ☐ Grain
- ☐ Hardware
- ☐ Inspection Incomplete/Unqualified
- ☐ Instructions Incomplete/Unclear
- ☐ Misaligned/off center
- ☐ Mislabeled
- ☐ Misread
- ☐ Off-set
- ☐ Out of Calibration
- ☐ Out of Sequence
- ☐ Outside Dimensions
- ☐ Over/Under tolerance
- ☐ Part Incorrect
- ☐ Part Lost/Missing
- ☐ Part Moved
- ☐ Positioned Wrong
- ☐ Power Loss/Surge
- ☐ Pressure/Forced
- ☐ Set-up
- ☐ Temperature/Cure
- ☐ Weld
- ☐ Wrong Stock Pulled
- ☐ Other

_____

_____

_____

**Item ID:** D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*
**Revision ID:** **Stop** *NS2*
**Item Name:** Crosstube Aft

**Start Date:** 6/17/13 **Start Qty:** 1.00 *1* **Cust Item ID:**
**Required Date:** 6/17/13 **Req'd Qty:** 1.00 *1* **Customer:**
**Reference:**

**Run Start** *NR1*
**Stop** *NR2*

**Approvals:** **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
**QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|---|---|---|---|---|---|---|---|---|---|
| 240 | QC5- Inspect part completeness to step on W/O | 0.00 DAS 27 9-89 | | | | 1 | | | |
| *240* QC Quality Control | **Memo** ***RE-CHECK TORCQUE ON CLAMP AFTER PROSEAL HAS CURED FOR 24HOURS AS PER DWG.*** | 0.00 B9.5 | | | | | | | |
| 250 | Pick Kit | 0.00 | | | | 1X | DAS 28 9-89 | 13-09-5 | SP |
| *250* Packaging Packaging | **Memo** | 0.00 | | | | | | | |
| 260 | QC4- 100% Inspect kits for completeness | 0.00 SMP | | | | 1 | | | |
| *260* QC Quality Control | **Memo** | 0.00 B9.5 | | | | | | | |

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

Rework ☐
Scrap ☐
Use-as-is ☐
Suspected Unapproved ☐

**AGAINST DEPARTMENT/PROCESS**

Skid-tube ☐ Crosstube ☐ Water Jet ☐ Engineering ☐
Machining ☐ Small Fab ☐ Prod. Eng. Coor. ☐ Quality ☐
Thermoforming ☐ Finishing ☐ Rec/Store/Packaging ☐ Other ☐
Large Fab ☐ Composite ☐ Supplier ☐

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

☐ Bending
☐ Centre Not Concentric
☐ Cracks
☐ Crimp/Kink/Ripple/Wave
☐ Cuffs
☐ Crushing
☐ Heat Treat
☐ Inspection Strip in Tube
☐ Marks/Chatter
☐ Turning Sequence
☐ Wave/Twist in Tube

**General**

☐ Bend
☐ BOM/Route
☐ Broken/Damage/Defect
☐ Burrs
☐ Contamination
☐ Countersink
☐ Cut Too Short
☐ Drawing
☐ Drill Holes
☐ Finish
☐ Fit/Function
☐ Folio/Program
☐ Grain
☐ Hardware
☐ Inspection Incomplete/Unqualified
☐ Instructions Incomplete/Unclear
☐ Misaligned/off center
☐ Mislabeled
☐ Misread
☐ Off-set
☐ Out of Calibration
☐ Out of Sequence
☐ Outside Dimensions
☐ Over/Under tolerance
☐ Part Incorrect
☐ Part Lost/Missing
☐ Part Moved
☐ Positioned Wrong
☐ Power Loss/Surge
☐ Pressure/Forced
☐ Set-up
☐ Temperature/Cure
☐ Weld
☐ Wrong Stock Pulled
☐ Other

_____
_____
_____

**Item ID:** D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*
**Revision ID:** **Stop** *NS2*
**Item Name:** Crosstube Aft
**Start Date:** 6/17/13 **Start Qty:** 1.00 *1* **Cust Item ID:**
**Required Date:** 6/17/13 **Req'd Qty:** 1.00 *1* **Customer:**
**Reference:**

**Run Start** *NR1*
**Stop** *NR2*

**Approvals:** **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
**QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|---|---|---|---|---|---|---|---|---|---|
| 270 | | 0.00 | | | | | | | |
| *270* | Packaging | | | | | 1 | S | 13-9-5 | |
| Packaging | **Memo** | 0.00 | | | | | | | |
| Packaging | Identify and pack for shipping as per PPP D412-664-203<br>******Ensure tube is not packaged if curing time is less than 12 hrs, see step 27 for application time & date *******<br>Time & date of packaging: _____<br>Location: FG-104 | | | | | 1 | M.D. 13-09-5 | | |
| 280 | QC21- Final Inspection - Work Order Release | 0.00 | | | | | | | |
| *280* | | | | | | | 13/9 | 9dd | |
| QC | **Memo** | 0.00 | | | | | | | |
| Quality Control | | | | | | | | | |

QA B09-6

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

Rework ☐
Scrap ☐
Use-as-is ☐
Suspected Unapproved ☐

**AGAINST DEPARTMENT/PROCESS**

Skid-tube ☐ Crosstube ☐ Water Jet ☐ Engineering ☐
Machining ☐ Small Fab ☐ Prod. Eng. Coor. ☐ Quality ☐
Thermoforming ☐ Finishing ☐ Rec/Store/Packaging ☐ Other ☐
Large Fab ☐ Composite ☐ Supplier ☐

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

☐ Bending
☐ Centre Not Concentric
☐ Cracks
☐ Crimp/Kink/Ripple/Wave
☐ Cuffs
☐ Crushing
☐ Heat Treat
☐ Inspection Strip in Tube
☐ Marks/Chatter
☐ Turning Sequence
☐ Wave/Twist in Tube

**General**

☐ Bend
☐ BOM/Route
☐ Broken/Damage/Defect
☐ Burrs
☐ Contamination
☐ Countersink
☐ Cut Too Short
☐ Drawing
☐ Drill Holes
☐ Finish
☐ Fit/Function
☐ Folio/Program
☐ Grain
☐ Hardware
☐ Inspection Incomplete/Unqualified
☐ Instructions Incomplete/Unclear
☐ Misaligned/off center
☐ Mislabeled
☐ Misread
☐ Off-set
☐ Out of Calibration
☐ Out of Sequence
☐ Outside Dimensions
☐ Over/Under tolerance
☐ Part Incorrect
☐ Part Lost/Missing
☐ Part Moved
☐ Positioned Wrong
☐ Power Loss/Surge
☐ Pressure/Forced
☐ Set-up
☐ Temperature/Cure
☐ Weld
☐ Wrong Stock Pulled
☐ Other

_____
_____
_____

# Picklist Print

*June-12-13 9:15:37 AM*



**Work Order ID:** 102862

**Parent Item:** D412-664-203 **Start Date:** 6/17/13 **Required Date:** 6/17/13

**Parent Item Name:** Crosstube Aft **Start Qty:** 1.00 **Required Qty:** 1.00

**Comments:** IPP Rev:E04.02.16Reformat; Added D3189-1K/DS
IPP Rev:F 06-03-29 Remove Coments on Pick List JLM
IPP Rev:G 06.12.08 per ECN 886 EC
IPP Rev:H 07-04-30 As per Rev D JLM
IPP Rev:I 08-06-12 add comment in seq. 21 DD verified by:EC IPP rev J 11.04.21 DEO D412-664-243-E-1 EC verified DD IPP REV:K 11.10.03 DEO D412-664-243-E-2 DD verf:EC

| Component Item ID / Item Name | Replacement Item ID | Mfg/ Purch | Bin Item | Primary Location | Last Location | Route Seq ID | Unit of Measure | Qty on Hand | Qty per Kit | Total Qty | Qty Issued | Date Issued | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted] AN6-40A Bolt | | Purchased | No | | | 250 | Each | 98.0000 | 4 | 4 | DAS 28 9-89 | 13-09-5 | DAS 26 9-89 |
| DAS 27 9-89 | | | | Location | | Loc Qty | | Loc Code | | | | | |
| | | | | ST517a | | 98 | | | 126105 | | | | |
| | | | | | 124561 | 23 | | | | | | | |
| | | | | | 125388 | 75 | | | | | | | |
| [redacted] AN6-41A Bolt | | Purchased | No | | | 250 | Each | 68.0000 | 2 | 2 | DAS 28 9-89 | | DA 26 9-89 |
| DAS 27 9-89 | | | | Location | | Loc Qty | | Loc Code | | | | | |
| | | | | ST340 | | 18 | | | | | | | |
| | | | | | 124561 | 18 | | | | | | | |
| | | | | ST517 | | 50 | | | 2X | | | | |
| | | | | | 125388 | 50 | | | | | | | |
| [redacted] AN960JD616 Washer | NAS1149D0663J | Purchased | No | | | 250 | Each | 0.0000 | 18 | 18 | DAS 28 9-89 | | DAS 26 9-89 |
| | | | | | | | | | 126284 | | | | |
| D2896-1 Support | DAS 27 9-89 | Manufactured | No | | | 230 | Each | 30.0000 | 1 | 1 | AB 13-8-28 | | |
| | | | | Location | | Loc Qty | | Loc Code | | | | | |
| | | | | LG053 | | 30 | | | | | | | |
| | | | | | 74465 | 8 | | | | | | | |
| | | | | | 86663 | 1 | | | | | | | |
| | | | | | 90378 | 2 | | | | | | | |
| | | | | | 96821 | 19 | | | (1) | | | | |

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

DART AEROSPACE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

| | |
|---|---|
| Rework | ☐ |
| Scrap | ☐ |
| Use-as-is | ☐ |
| Suspected Unapproved | ☐ |

**AGAINST DEPARTMENT/PROCESS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Skid-tube | ☐ | Crosstube | ☐ | Water Jet | ☐ | Engineering | ☐ |
| Machining | ☐ | Small Fab | ☐ | Prod. Eng. Coor. | ☐ | Quality | ☐ |
| Thermoforming | ☐ | Finishing | ☐ | Rec/Store/Packaging | ☐ | Other | ☐ |
| Large Fab | ☐ | Composite | ☐ | Supplier | ☐ | | ☐ |

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

| | |
|---|---|
| ☐ | Bending |
| ☐ | Centre Not Concentric |
| ☐ | Cracks |
| ☐ | Crimp/Kink/Ripple/Wave |
| ☐ | Cuffs |
| ☐ | Crushing |
| ☐ | Heat Treat |
| ☐ | Inspection Strip in Tube |
| ☐ | Marks/Chatter |
| ☐ | Turning Sequence |
| ☐ | Wave/Twist in Tube |

**General**

| | |
|---|---|
| ☐ | Bend |
| ☐ | BOM/Route |
| ☐ | Broken/Damage/Defect |
| ☐ | Burrs |
| ☐ | Contamination |
| ☐ | Countersink |
| ☐ | Cut Too Short |
| ☐ | Drawing |
| ☐ | Drill Holes |
| ☐ | Finish |
| ☐ | Fit/Function |
| ☐ | Folio/Program |
| ☐ | Grain |
| ☐ | Hardware |
| ☐ | Inspection Incomplete/Unqualified |
| ☐ | Instructions Incomplete/Unclear |
| ☐ | Misaligned/off center |
| ☐ | Mislabeled |
| ☐ | Misread |
| ☐ | Off-set |
| ☐ | Out of Calibration |
| ☐ | Out of Sequence |
| ☐ | Outside Dimensions |
| ☐ | Over/Under tolerance |
| ☐ | Part Incorrect |
| ☐ | Part Lost/Missing |
| ☐ | Part Moved |
| ☐ | Positioned Wrong |
| ☐ | Power Loss/Surge |
| ☐ | Pressure/Forced |
| ☐ | Set-up |
| ☐ | Temperature/Cure |
| ☐ | Weld |
| ☐ | Wrong Stock Pulled |
| ☐ | Other |

_____

_____

_____

**Work Order ID:** **102862**

**Parent Item:** **D412-664-203**

**Parent Item Name:** Crosstube Aft

**Start Date:** 6/17/13 **Required Date:** 6/17/13

**Start Qty:** 1.00 **Required Qty:** 1.00

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **D3189-1**<br>Chafing Shield(send DSI9629 with spares) | Manufactured | No | | 230 | Each | 32.0000 | 2 | 2 |

103375

| Location | Loc Qty | Loc Code | |
|---|---|---|---|
| FG | 4 | | |
| 36065 | 4 | | |
| LG052 | 12 | | |
| 99588 | 12 | | |
| LG053 | 16 | | |
| 100617 | 3 | | |
| 89901 | 4 | | |
| 91673 | 2 | | |
| 99911 | 7 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **D3595-063-570**<br>RUBBER CUSHION | Manufactured | No | | 230 | Each | 160.0000 | 2 | 2 |

| Location | Loc Qty | Loc Code | |
|---|---|---|---|
| FG | 10 | | |
| 42243 | 10 | | |
| LG051 | 107 | | |
| 71534 | 1 | | |
| 76546 | 2 | | |
| 83294 | 49 | | |
| 95262 | 55 | | |
| LG055 | 43 | | |
| 92940 | 43 | | |

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

DART AEROSPACE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

- Rework ☐
- Scrap ☐
- Use-as-is ☐
- Suspected Unapproved ☐

**AGAINST DEPARTMENT/PROCESS**

| | | | |
|---|---|---|---|
| Skid-tube ☐ | Crosstube ☐ | Water Jet ☐ | Engineering ☐ |
| Machining ☐ | Small Fab ☐ | Prod. Eng. Coor. ☐ | Quality ☐ |
| Thermoforming ☐ | Finishing ☐ | Rec/Store/Packaging ☐ | Other ☐ |
| Large Fab ☐ | Composite ☐ | Supplier ☐ | ☐ |

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

- ☐ Bending
- ☐ Centre Not Concentric
- ☐ Cracks
- ☐ Crimp/Kink/Ripple/Wave
- ☐ Cuffs
- ☐ Crushing
- ☐ Heat Treat
- ☐ Inspection Strip in Tube
- ☐ Marks/Chatter
- ☐ Turning Sequence
- ☐ Wave/Twist in Tube

**General**

- ☐ Bend
- ☐ BOM/Route
- ☐ Broken/Damage/Defect
- ☐ Burrs
- ☐ Contamination
- ☐ Countersink
- ☐ Cut Too Short
- ☐ Drawing
- ☐ Drill Holes
- ☐ Finish
- ☐ Fit/Function
- ☐ Folio/Program
- ☐ Grain
- ☐ Hardware
- ☐ Inspection Incomplete/Unqualified
- ☐ Instructions Incomplete/Unclear
- ☐ Misaligned/off center
- ☐ Mislabeled
- ☐ Misread
- ☐ Off-set
- ☐ Out of Calibration
- ☐ Out of Sequence
- ☐ Outside Dimensions
- ☐ Over/Under tolerance
- ☐ Part Incorrect
- ☐ Part Lost/Missing
- ☐ Part Moved
- ☐ Positioned Wrong
- ☐ Power Loss/Surge
- ☐ Pressure/Forced
- ☐ Set-up
- ☐ Temperature/Cure
- ☐ Weld
- ☐ Wrong Stock Pulled
- ☐ Other

_____

_____

_____

# Picklist Print

*June-12-13 9:15:38 AM*

**Work Order ID:** 102862
**Parent Item:** D412-664-203
**Parent Item Name:** Crosstube Aft

**Start Date:** 6/17/13 **Required Date:** 6/17/13
**Start Qty:** 1.00 **Required Qty:** 1.00

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **D412-664-203TRN**<br>Crosstube Turning Detail | Manufactured | No | B104706 | 110 | Each | 11.0000 | **1** | **1** | |

| Location | Loc Qty | Loc Code |
|---|---|---|
| LG | 7 | |
| 101943 | 1 | |
| 101944 | 1 | |
| 101945 | 1 | |
| 94355 | 1 | |
| 96406 | 1 | |
| 96775 | 1 | |
| 96852 | 1 | |
| LG003 | 2 | |
| 101523 | 1 | |
| 101946 | 1 | |
| LG014 | 2 | |
| 90960 | 1 | |
| 90961 | 1 | |

JW 13-08-16

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **MS21042L6**<br>Nut | Purchased | No | | 250 | Each | 421.0000 | 6 | **6** | DAS 28 9-89 13-09-5 |

DAS 27 9-89

| Location | Loc Qty | Loc Code |
|---|---|---|
| ST314 | 421 | |
| 123248 | 9 | |
| 125535 | 412 | |

6X

DAS 26 9-89

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

DART AEROSPACE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

- Rework ☐
- Scrap ☐
- Use-as-is ☐
- Suspected Unapproved ☐

**AGAINST DEPARTMENT/PROCESS**

- Skid-tube ☐
- Machining ☐
- Thermoforming ☐
- Large Fab ☐
- Crosstube ☐
- Small Fab ☐
- Finishing ☐
- Composite ☐
- Water Jet ☐
- Prod. Eng. Coor. ☐
- Rec/Store/Packaging ☐
- Supplier ☐
- Engineering ☐
- Quality ☐
- Other ☐

| Root Cause | | Date | Step | Qty | Description of work order update or non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

- ☐ Bending
- ☐ Centre Not Concentric
- ☐ Cracks
- ☐ Crimp/Kink/Ripple/Wave
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- ☐ Crushing
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- ☐ Turning Sequence
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**General**

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- ☐ Countersink
- ☐ Cut Too Short
- ☐ Drawing
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- ☐ Folio/Program
- ☐ Grain
- ☐ Hardware
- ☐ Inspection Incomplete/Unqualified
- ☐ Instructions Incomplete/Unclear
- ☐ Misaligned/off center
- ☐ Mislabeled
- ☐ Misread
- ☐ Off-set
- ☐ Out of Calibration
- ☐ Out of Sequence
- ☐ Outside Dimensions
- ☐ Over/Under tolerance
- ☐ Part Incorrect
- ☐ Part Lost/Missing
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- ☐ Power Loss/Surge
- ☐ Pressure/Forced
- ☐ Set-up
- ☐ Temperature/Cure
- ☐ Weld
- ☐ Wrong Stock Pulled
- ☐ Other

_____

_____

_____

# Picklist Print

*June-12-13 9:15:38 AM*

**Work Order ID:** 102862
**Parent Item:** D412-664-203
**Parent Item Name:** Crosstube Aft

**Start Date:** 6/17/13 **Required Date:** 6/17/13
**Start Qty:** 1.00 **Required Qty:** 1.00

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **MS21920-28**<br>Clamp(per MIL-DTL-8783C) | Purchased | No | 230 | Each | 117.0000 | 4 | 4 | Ad 13-8-28 |

126292

| Location | Loc Qty | Loc Code | |
|---|---|---|---|
| FG | 5 | | |
| 105884 | 5 | | |
| LG | 50 | | |
| M125728 | 50 | | |
| LG050 | 47 | | |
| 123674 | 14 | | |
| 124505 | 4 | | |
| 125351 | 29 | | |
| LG051 | 15 | | |
| 121440 | 8 | | |
| 123243 | 2 | | |
| 124260 | 5 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **MS21920-30**<br>clamp(per MIL-DTL-8783C) | Purchased | No | 230 | Each | 87.0000 | 2 | 2 | Ad 13-8-28 |

| Location | Loc Qty | Loc Code | |
|---|---|---|---|
| LG050 | 69 | | |
| 119529 | 1 | | |
| 123240 | 18 | | |
| 124624 | 50 | | |
| LG051 | 18 | | |
| 111258 | 14 | | |
| 121583 | 4 | | |

DQA: _____ Date: _____

# WORK ORDER NON-CONFORMANCE / UPDATE

DART AEROSPACE

QA Closed: Date: Work Order update only ☐

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

- Rework ☐
- Scrap ☐
- Use-as-is ☐
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- Skid-tube ☐
- Machining ☐
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- Small Fab ☐
- Finishing ☐
- Composite ☐
- Water Jet ☐
- Prod. Eng. Coor. ☐
- Rec/Store/Packaging ☐
- Supplier ☐
- Engineering ☐
- Quality ☐
- Other ☐

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|---|---|---|---|---|---|---|---|---|---|---|
| Design | ☐ | | | | | | | | | |
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Handling/Pre | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Offset/Setup | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Transport | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

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- ☐ Inspection Strip in Tube
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- ☐ Turning Sequence
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**General**

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- ☐ BOM/Route
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- ☐ Burrs
- ☐ Contamination
- ☐ Countersink
- ☐ Cut Too Short
- ☐ Drawing
- ☐ Drill Holes
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- ☐ Folio/Program
- ☐ Grain
- ☐ Hardware
- ☐ Inspection Incomplete/Unqualified
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- ☐ Misaligned/off center
- ☐ Mislabeled
- ☐ Misread
- ☐ Off-set
- ☐ Out of Calibration
- ☐ Out of Sequence
- ☐ Outside Dimensions
- ☐ Over/Under tolerance
- ☐ Part Incorrect
- ☐ Part Lost/Missing
- ☐ Part Moved
- ☐ Positioned Wrong
- ☐ Power Loss/Surge
- ☐ Pressure/Forced
- ☐ Set-up
- ☐ Temperature/Cure
- ☐ Weld
- ☐ Wrong Stock Pulled
- ☐ Other

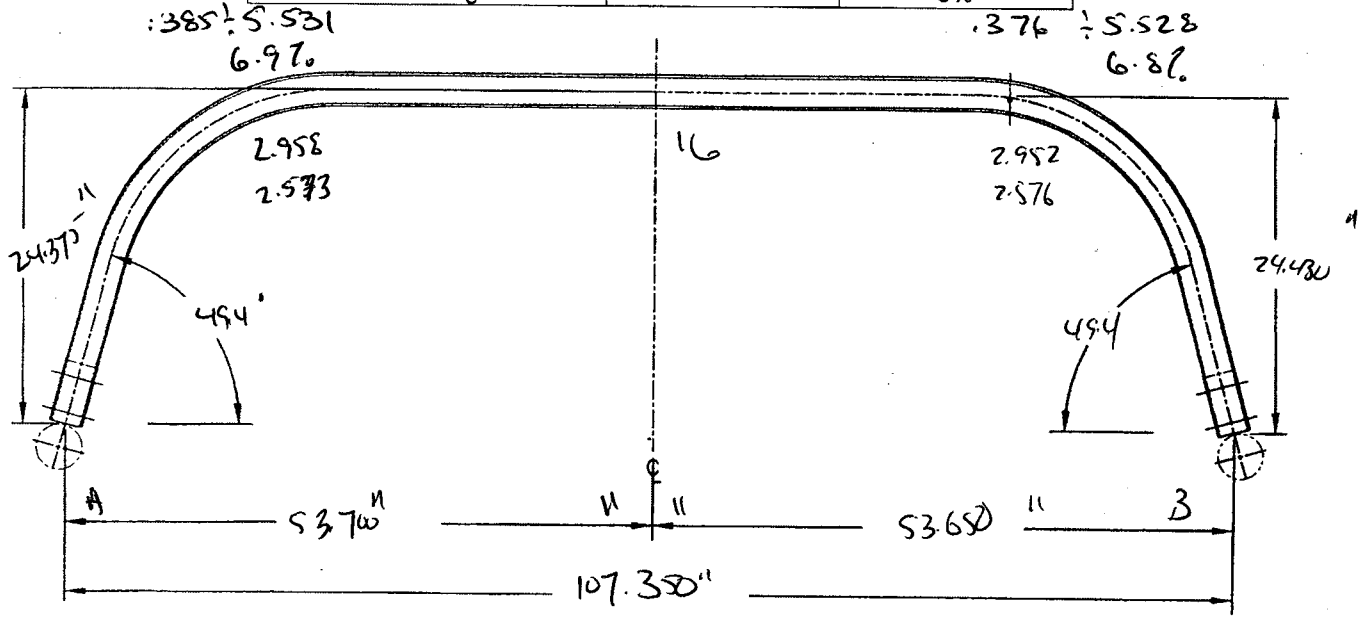
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_____

| DART AEROSPACE LTD | Work Order: | 102862 |
|---|---|---|
| | | |
| **Description:** Crosstube High Aft (412) | Part Number: | D412-664-203 |
| | | |
| **Inspection Dwg:** D412-664-243 **Rev:** E | | Page 1 of 1 |

| Required Dimension | Min | Max |
|---|---|---|
| Height | 24.24 | 24.50 |
| 1/2 Span | 53.59 | 53.85 |
| Angle | 49 | 52 |
| Total Span | 107.18 | 107.70 |
| Bending Passes | 8 | -- |
| Crushing | -- | 6% |




| | Side A | Middle | Side B |
|---|---|---|---|
| **Bending Passes** | 11 | 16 | 11 |
| **Crushing** | 6.9% | | 6.8% |
| **Comments** | | | |
| Side A = 6.9% crushing @ 11 passes | | | |
| Middle = 16 Passes | | | |
| Side B = 6.8% crushing @ 11 passes | | | |

| QC15 Inspection | ~~DAS~~ 16 |
|---|---|
| Date | ~~9-89~~ 13/08/15 |

| Rev | Date | Change | Revised by | Approved |
|---|---|---|---|---|
| A | 07.02.06 | New Issue | KJ/JM | |
| B | 07.05.08 | Dimensions updated per Dwg rev. D | KJ/JLM | |
| C | 10.02.02 | Dwg Rev updated | KJ | |
| D | 12.04.16 | Added bending, crushing dimensions | KJ | |

| Item | Qty -243 | Part Number | Description |
|---|---|---|---|
| 1 | X | D412-664-243 | CROSSTUBE ASSEMBLY (412 HIGH AFT) |
| 2 | 1 | D6009-129 | CROSSTUBE |
| 3 | 2 | D3595-063-570 | RUBBER CUSHION |
| 4 | 1 | D2896-1 | SUPPORT |
| 5 | 2 | D3189-1 | CHAFING SHIELD |
| 6 | 2 | D2856-600-1009 | ABRASION STRIP |
| 7 | 4 | MS21920-28 | CLAMP |
| 8 | 2 | MS21920-30 | CLAMP (OR MS21920-32) |
| 9 | A/R | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE) |

**GENERAL NOTES:**

1) MATERIAL: MANUFACTURED FROM D6009-129
   FINISHED LENGTH = 124.100±0.020 (BEFORE BENDING/TRIMMING)
2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
   PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
   PAINT OUTSIDE PER DART QSI 005 4.2
3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
4) UNITS: INCHES UNLESS OTHERWISE NOTED.
5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
6) IDENTIFICATION: SCRIBE DART PART NUMBER "D412-664-243" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
7) WEIGHT: 47.0 lbs (PER IIN-D212-664)
8) PART IS SYMMETRIC ABOUT CENTERLINE.
9) RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALY, TRANSITION SHOULD BE SMOOTH.
10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
13) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
15) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

UNC
S

102662 MCJ
13-06-14

② DEO ATTACHED

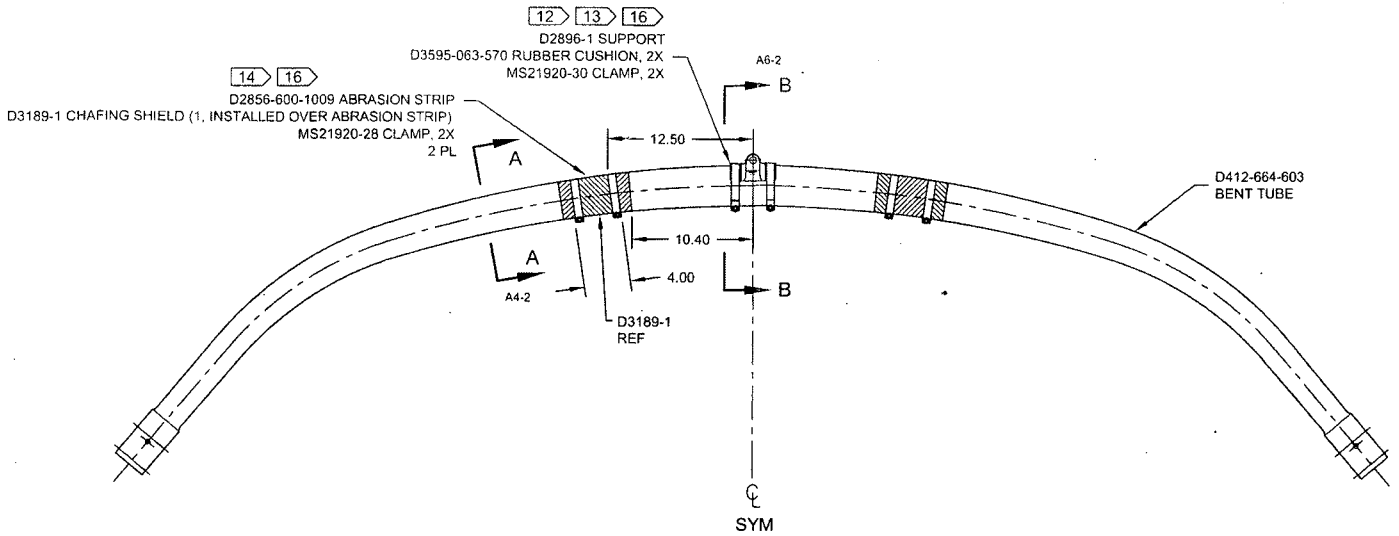
RELEASED
2009 -10- 29

| REV. | DESCRIPTION | BY | DATE |
|---|---|---|---|
| E | REFORMAT/REVISE GENERAL NOTES; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); ADD TOLERANCE (ZN B6-3, C4-3, C8-3 & C5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4. | RF | 09.09.30 |
| D | REMOVE D2732-058, CHANGE TO D3595-063-570 | PH | 07.03.09 |
| C | REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398, MS21920-32 WAS MS21920-30 | MB | 06.10.27 |
| B | ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES | PH | 05.02.04 |
| A | NEW ISSUE | PH | 01.10.17 |

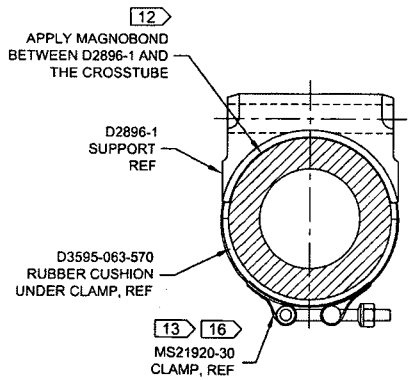
| | | | |
|---|---|---|---|
| DESIGN | PH | DART AEROSPACE LTD<br>HAWKESBURY, ONTARIO, CANADA | |
| DRAWN | RF | | |
| CHECKED | | DRAWING NO. | REV. E |
| MFG. APPR. | | D412-664-243 | SHEET 1 OF 4 |
| APPROVED | | TITLE | SCALE |
| DE APPR. | | CROSSTUBE ASSEMBLY (412 HI AFT) | NTS |
| DATE | 09.09.30 | | |

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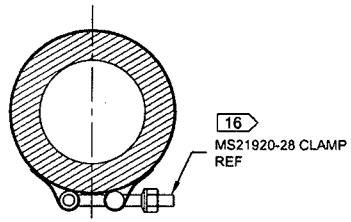
102662




**D212-664-243**
**ASSEMBLY DETAIL** E




**SECTION B-B** D4-2
SCALE 4X



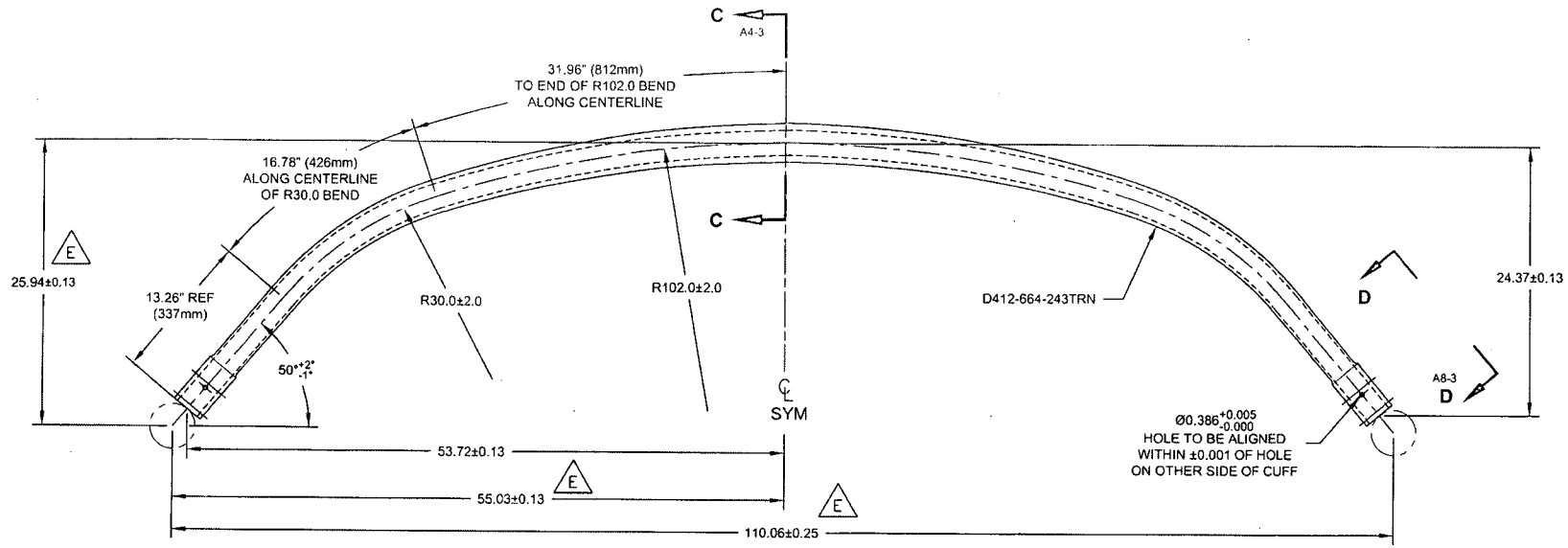

**SECTION A-A** C6-2
SCALE 4X

(2) DEO 15 ATTACHED

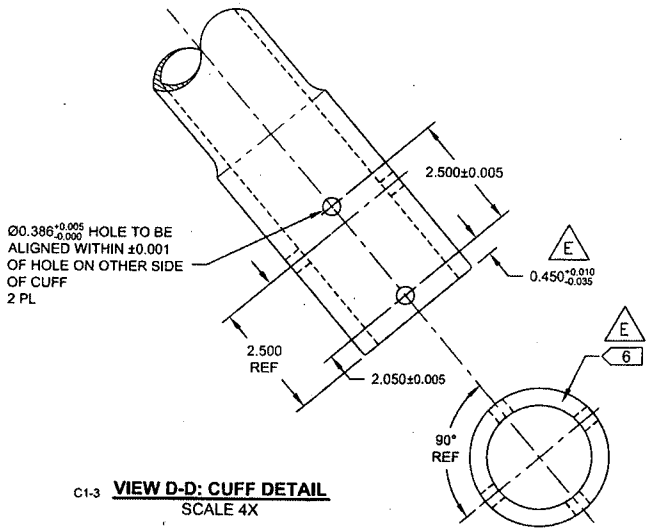
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2009 -10- 29

| | | | |
|---|---|---|---|
| DESIGN | PH | **DART AEROSPACE LTD** | |
| DRAWN | RF | HAWKESBURY, ONTARIO, CANADA | |
| CHECKED | | DRAWING NO. | REV. E |
| MFG. APPR. | | D412-664-243 | SHEET 2 OF 4 |
| APPROVED | | TITLE | SCALE |
| DE APPR. | | CROSSTUBE ASSEMBLY (412 HI AFT) | NTS |
| DATE | 09.09.30 | COPYRIGHT © 2001 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD | |

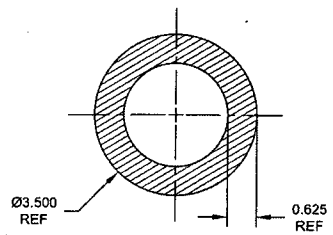
102862




**D412-664-603** 10 E
**BENDING AND DRILLING DETAIL**




C1-3 **VIEW D-D: CUFF DETAIL**
SCALE 4X



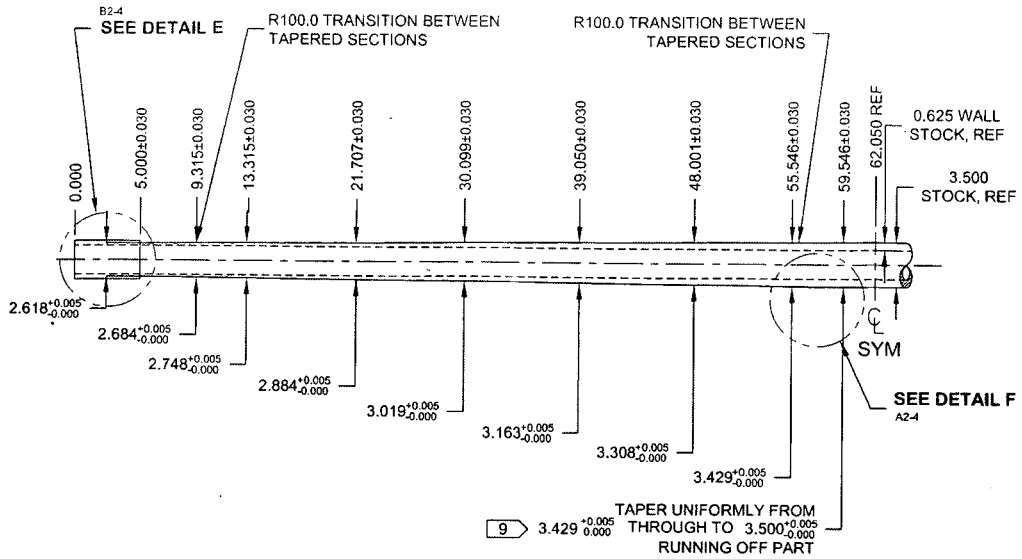

**SECTION C-C** D5-3
SCALE 4X

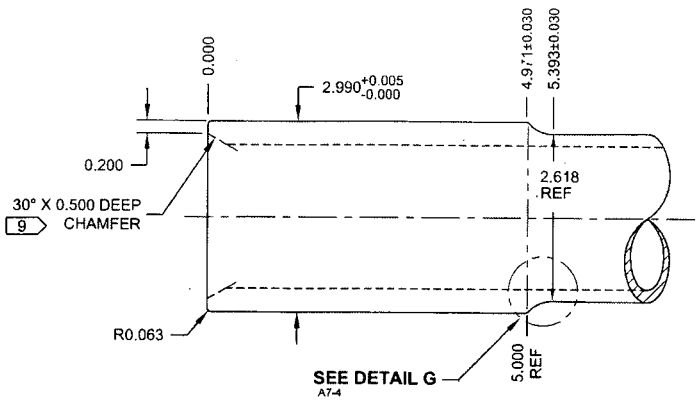
② DEO 75 ATTACHED

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2009 -10- 29
MP

| | | |
|---|---|---|
| DESIGN | PH | **DART AEROSPACE LTD** HAWKESBURY, ONTARIO, CANADA |
| DRAWN | RF | |
| CHECKED | | DRAWING NO. D412-664-243 REV. E SHEET 3 OF 4 |
| MFG. APPR. | | |
| APPROVED | | TITLE CROSSTUBE ASSEMBLY (412 HI AFT) SCALE NTS |
| DE APPR. | | |
| DATE 09.09.30 | | COPYRIGHT © 2001 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD |

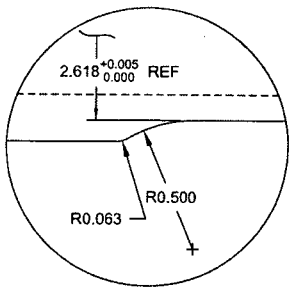
102467



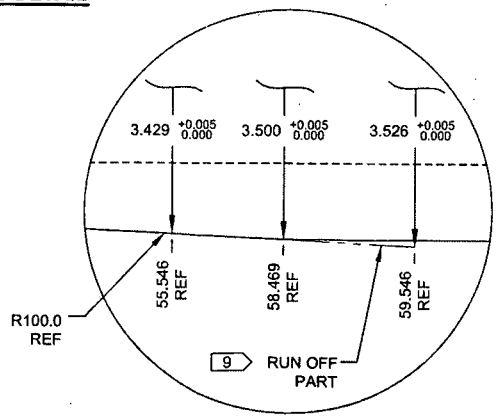




**DETAIL E:**
**CROSSTUBE CUFF** D8-4
SCALE 5X

**D412-664-243TRN**
**TURNING DETAIL** E




**DETAIL G:**
**CUFF TRANSITION** C2-4
SCALE 10X




**DETAIL F:**
**TAPER RUN-OFF** C4-4
NOT TO SCALE

② DEO ATTACHED

RELEASED
2009 -10- 29

| | | | |
|---|---|---|---|
| DESIGN | PH | **DART AEROSPACE LTD** HAWKESBURY, ONTARIO, CANADA | |
| DRAWN | RF | | |
| CHECKED | | DRAWING NO. | REV. E |
| MFG. APPR. | | D412-664-243 | SHEET 4 OF 4 |
| APPROVED | | TITLE | SCALE |
| DE APPR. | | CROSSTUBE ASSEMBLY (412 HI AFT) | NTS |
| DATE | 09.09.30 | | |

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102862

| DRAWING NO. | TITLE | REV. E | DART AEROSPACE LTD | D.E.O. NO. | SHEET NO. | SCALE |
|---|---|---|---|---|---|---|
| D412-664-243 | CROSSTUBE ASS'Y (412 HI AFT) | | ENGINEERING ORDER | D412-664-243-E-2 | SHEET 1 OF 1 | NTS |

| DRAWN | CHECKED | MFG. APPR. | APPROVED | DE APPR. |
|---|---|---|---|---|
| DATE 11.09.07 | DATE 11.09.19 | DATE 11.09.19 | DATE 11.09.19 | DATE 11.09.19 |

**PURPOSE:**
REPLACE MAGNOBOND WITH 3M DP460 SCOTCH-WELD EPOXY ADHESIVE

**CHANGE:**

**IS:**

| Item | Qty -243 | Part Number | Description |
|---|---|---|---|
| 9 | A/R | SCOTCH-WELD DP460 | EPOXY ADHESIVE, 3M SCOTCH-WELD |

**WAS:**

| | | | |
|---|---|---|---|
| 9 | A/R | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE) |

NOTE 12 & 16, SHEET 1 IS AMENDED AS FOLLOWS:

**IS:**

12) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.

16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.**

**WAS:**

12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.

16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

RELEASED
2011-09-29

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10262

| DRAWING NO. | TITLE | REV. | DART AEROSPACE LTD | D.E.O. NO. | SHEET NO. | SCALE |
|---|---|---|---|---|---|---|
| D412-664-243 | CROSSTUBE ASSEMBLY (412 HI AFT) | E | ENGINEERING ORDER | D412-664-243-E-4 | SHEET 1 OF 3 | NTS |

| DRAWN | CHECKED | MFG. APPR. | APPROVED | DE APPR. |
|---|---|---|---|---|
| DATE 12.08.21 | DATE 12.08.30 | DATE 12.08.30 | DATE 12/8/30 | DATE 12.08.30 |

**PURPOSE:**
REMOVED ABRASION STRIP IN FAVOR OF A THIN LAYER OF PROSEAL 890. UPDATE INSTALLATION OF CHAFING SHIELDS AND REDUCE TORQUE TO 40-50 IN-LBS. THIS ENGINEERING ORDER SUPERCEDES DEO D412-664-243-E-1.

**CHANGE:**

**PARTS LIST IS AMENDED AS FOLLOWS:**

**IS:**

| Item | Qty -243 | Part Number | Description |
|---|---|---|---|
| ~~6~~ | ~~0~~ | ~~D2856-600-1009~~ | ~~ABRASION STRIP~~ |

**WAS:**

| | | | |
|---|---|---|---|
| 6 | 2 | D2856-600-1009 | ABRASION STRIP |

**NOTES 2, 14, AND 16 ON SHEET 1 ARE AMENDED AS FOLLOWS:**

**IS:**

2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA)
PAINT OUTSIDE PER DART QSI 005 4.2
AFTER PAINTING, APPLY CLEAR COAT ON HATCHED AREA

14) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.

16) TORQUE CLAMPS ON D2896-1 SUPPORT 80 TO 100 IN-LB. **TORQUE CLAMPS ON D3189-1 CHAFING SHIELD 40 TO 50 IN-LB.** ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

**WAS:**

2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2

14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.

16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

RELEASED
2012 -09- 04

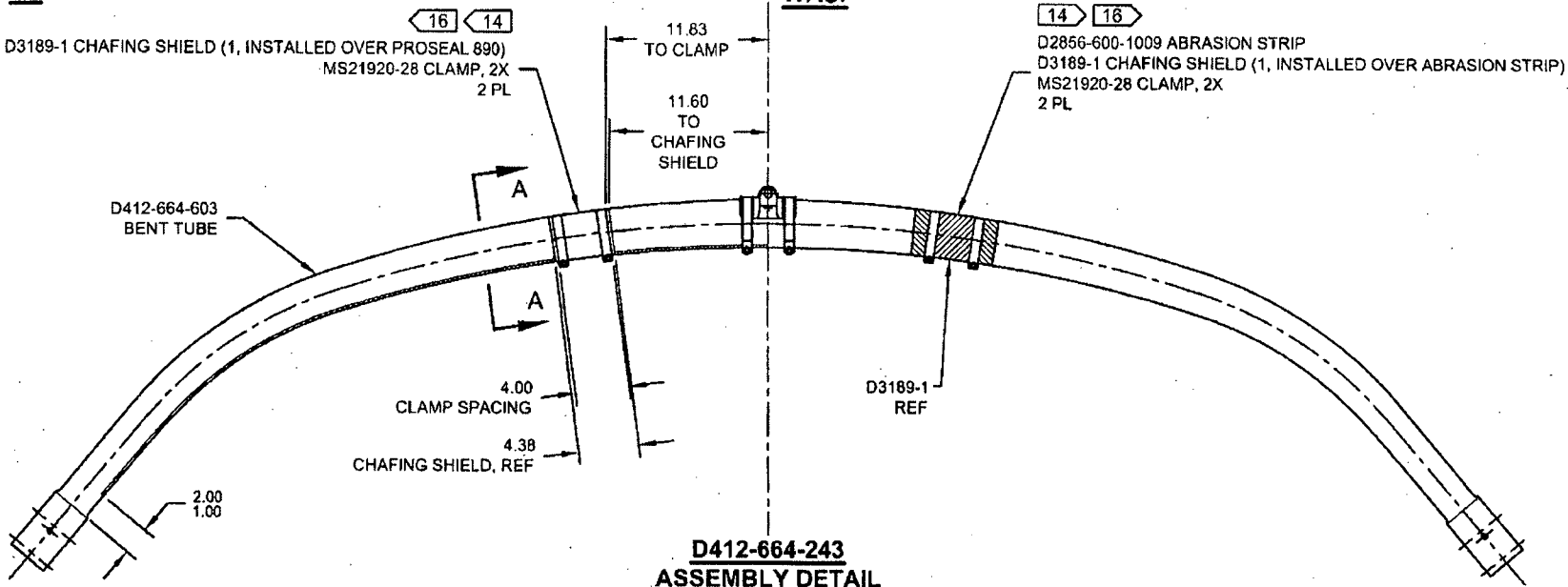
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10286Z

| DRAWING NO. | TITLE | REV. | DART AEROSPACE LTD ENGINEERING ORDER | D.E.O. NO. | SHEET NO. | SCALE |
|---|---|---|---|---|---|---|
| D412-664-243 | CROSSTUBE ASSEMBLY (412 HI AFT) | E | | D412-664-243-E-4 | SHEET 2 OF 3 | NTS |

| DRAWN | CHECKED | MFG. APPR. | APPROVED | DE APPR. |
|---|---|---|---|---|
| DATE 12.08.21 | DATE 12.08.27 | DATE 12.08.29 | DATE 12-28-29 | DATE 12.08.29 |

**IS:**

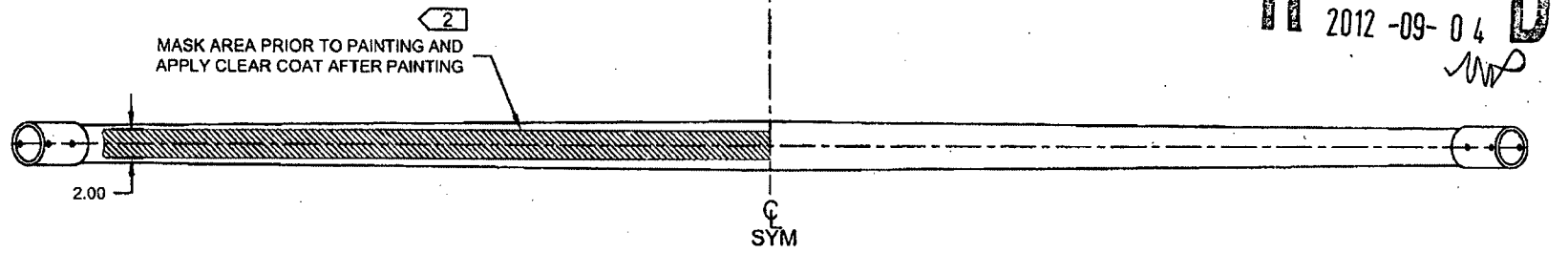



**WAS:**




**D412-664-243**
**ASSEMBLY DETAIL**

RELEASED
2012 -09- 04



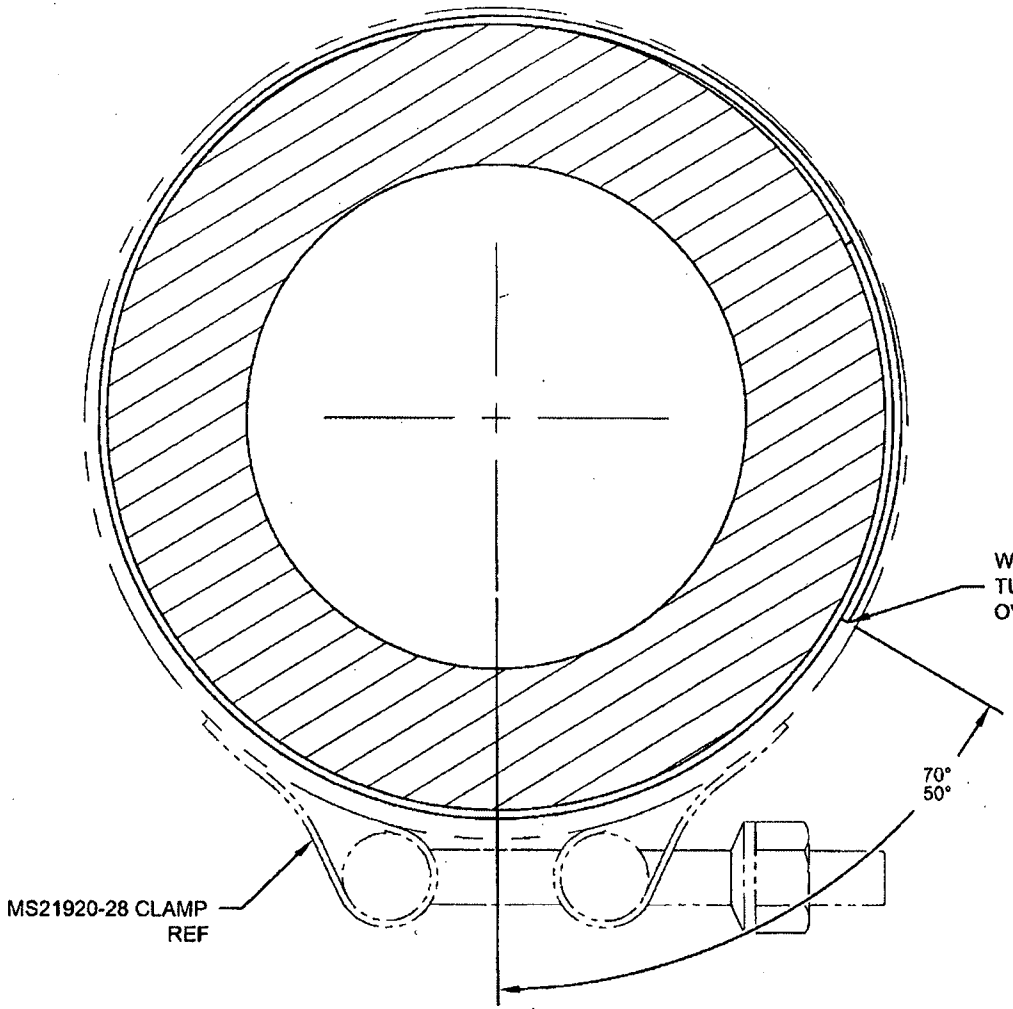


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102862

| DRAWING NO. | TITLE | REV. | DART AEROSPACE LTD | D.E.O. NO. | SHEET NO. | SCALE |
|---|---|---|---|---|---|---|
| D412-664-243 | CROSSTUBE ASSEMBLY (412 HI AFT) | E | ENGINEERING ORDER | D412-664-243-E-4 | SHEET 3 OF 3 | NTS |

| DRAWN | CHECKED | MFG. APPR. | APPROVED | DE APPR. |
|---|---|---|---|---|
| DATE 12.08.21 | DATE 12.08.27 | DATE 12.08.29 | DATE 12.08.29 | DATE 12.08.29 |




RELEASED
2012 -09- 04

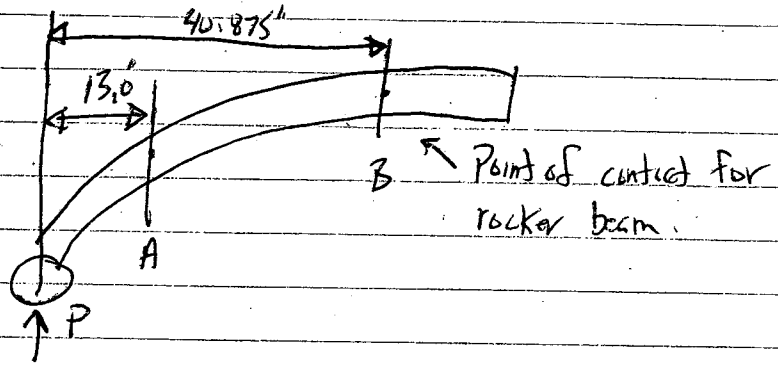
**SECTION A-A**
CHAFING SHIELD DETAIL
VIEW ROTATED, NOT TO SCALE

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11.12.06

CRUSHING OF D412-664-243

Acceptability of 8% CRUSHING AT END OF BEND




POINT A: $OD_1 = 2.961"$, $OD_2 = 2.522"$

CRUSHING = $(2.961-2.522)/(2.961+2.522) = 8\%$

$I = 1.676\ in^4$ (from AutoCAD)

POINT B: $OD_1 = 3.307"$, $I = 4.613\ in^4$

A: $F = Mc/I = P \times 13 \times 2.961 / 2 \times 1.676 = 11.484 \cdot P$

B: $F = P \times 40.875 \times 3.307 / 2 \times 4.613 = 14.651 \cdot P$

M.S. $= 14.651/11.484 - 1 = 0.27$

∴ Tube will break at rocker beam contact before crack of 8% crushing; 8% crushing in crack at end of tube bend is acceptable

11.12.06

ACUREN

# LIQUID PENETRANT TEST REPORT

P- 12253

PAGE 1 OF 1

CLIENT Dart Aerospace
ATTENTION Chantale, Linda, Andy
ADDRESS 1270 Aberdeen St
Hawkesbury, on

DATE Aug 22 2013 TIME AM ☑ PM ☐
ACUREN JOB NO. 183-13-C0317
PO/WO NO. 21640
WORK LOCATION As Address
ACCEPTANCE STD. Astm 1417/asme 300 REV./DATE 2005

PROJECT Pt-wet Fluorescent Liquid Penetrant Inspection
ITEM(S) EXAMINED - See Below

**JOB DESCRIPTION** | PROCEDURE NO. LT-~~002~~ REV./DATE 2009 | TECHNIQUE NO. LT-~~002~~-X REV./DATE 2009

PART NO. | MATERIAL Aluminium / c/s | THICKNESS —

SCOPE Performed a wet Fluo L.P.I on 100% of the external surface only on Items mentioned below

## TEST DETAILS

| | | | | | |
|---|---|---|---|---|---|
| METHOD | ☑ FLUORESCENT ☐ VISIBLE | | | ☑ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED | |
| FAMILY BRAND | MagneFlux | | | BLACK LIGHT S/N 3790 ☐ OUTPUT > 1000 µW/CM² ☐ AMBIENT < 2 fc | |
| PENETRANT | ZL-67 | MINIMUM DWELL TIME | 45 MIN. | LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT>100 fc @ SURFACE | |
| PENETRANT REMOVER | H2O | MINIMUM DRY TIME | >10 MIN. | OTHER | |
| DEVELOPER | SKD-S2 | MINIMUM DWELL TIME | 30 MIN. | LIGHT METER S/N 10987866 | CAL DUE DATE oct 2013 |
| DEVELOPER TYPE | ☑ NON AQUEOUS ☐ AQUEOUS | ☐ DRY | | | |

## TEST SURFACE

| | | | | |
|---|---|---|---|---|
| SURFACE CONDITION | ☐ AS GROUND | ☐ AS WELDED | ☑ MACHINED | ☐ SHOT BLASTED ☑ CLEAN BARE METAL |
| SURFACE TEMPERATURE | ☐ < - 4°C/ 20°F | ☐ - 4°C/ 20°F TO 10°C/50°F | ☑ 10°C/50°F TO 52°C/125°F | ☐ > 52°C/125°F |

## RESULTS- (☐ METRIC ☐ IMPERIAL)

| ITEM | COMMENTS | ACCEPT | REJECT | |
|---|---|---|---|---|
| 1 | Crosstube Aft w.o ID 102861 | ✓ | | Item ID 0412-664-203 |
| 2 | Crosstube Aft w.o ID 102862 | ✓ | | Item ID 0412-664-203 |
| 3 | Crosstube Aft w.o ID 102863 | ✓ | | Item ID 0412-664-203 |
| 4 | Crosstube mid Aft w.o ID 103065 | ✓ | | Item ID 0206-667-207 BL |
| 5 | Crosstube Mid Aft w.o ID 103270 | ✓ | | Item ID 0206-667-207 BL |
| 6 | Crosstube Mid Aft w.o ID 103272 | ✓ | | Item ID 0206-667-207 BL |
| 7 | Aft Crosstube High w.o ID 105322 | ✓ | | Item ID 0412-664-203 |
| 8 | 39" Aft Crosstube w.o ID 105508 | ✓ | | Item ID 0412-596-203 (Not Required) |
| 9 | Crosstube Mid Aft w.o ID 105659 | ✓ | | Item ID 0206-667-207 BL |

M/ 13-08-23

**Scope of Services**
*The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.*
**Standard of Care**
*In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.*

## SIGNATURES

CLIENT REPRESENTATIVE Andy Sheldon (PRINT) — A Sheldon (SIGNATURE)
TECHNICIAN (SIGNATURE):
NAME (PRINT): Alexandre Micaud (1ST TECHNICIAN) — (2ND TECHNICIAN)
CGSB LEVEL 2 SNT LEVEL 2 — CGSB LEVEL ____ SNT LEVEL ____
CGSB REG. NO 10148 — CGSB REG. NO ____

DTR # E-07953
REPORT REVIEWED BY:
NAME INITIALS

WHITE – CLIENT COPY CANARY – OFFICE COPY PINK – TECHNICIAN COPY GOLD – OFFICE COPY

ACUREN

# Daily Time Report

E- 07953

Form dated Mar 2009

Client: Dart Aerospace
Contact: Chantale, Linda, Andy
Location: Hawkesbury, on
Description: Pt- wet Fluo
Report #'s: P-12253

Job #: 188-13-C0317
Day: Sun Mon Tues Wed (Thurs) Fri Sat
P.O. #:
Vehicle # AM

Date: Aug 22 2013
W.O #:
Camera #: —

| Name | Specialist | Tech. | CEDO | Assistant | Start Time | | Total Hours: Travel | Worked | SP | KM | LOA (✓) ONLY | OTM (✓) ONLY | Labour Agreement (if known) or type of work | TLD No. | Daily DRD Readings |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | AM PM | | | | | ☐ | ☐☐ | | | |
| Alexandre Michaud | | ✓ | | | 6:00 | AM PM | 3 | 4 | | 230 | ☐ | ☐☐ | | | 0 |
| | | | | | | AM PM | | | | | ☐ | ☐☐ | | | |
| | | | | | | AM PM | | | | | ☐ | ☐☐ | | | |
| | | | | | | AM PM | | | | | ☐ | ☐☐ | | | |
| | | | | | | AM PM | | | | | ☐ | ☐☐ | | | |
| | | | | | | AM PM | | | | | ☐ | ☐☐ | | | |
| | | | | | | AM PM | | | | | ☐ | ☐☐ | | | |

## WELD INSPECTION SUMMARY

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weld Diameter | | | | | | | | | | | | Long Seam | | | | | Circ. Seam | | | | |
| Schedule/Thickness | | | | | | | | | | | | Thickness | | | | | Thickness | | | | |
| Quantity | | | | | | | | | | | | Lineal Ft. | | | | | Lineal Ft. | | | | |

Film: _____ Pcs. 2 ¾ x 17"
_____ Pcs. 3 ½ x 17"
_____ Pcs. 4 ½ x 17"
_____ Pcs. 14" x 17"
_____ Pcs. _____

Consumables (cans / litres): ___ UT 1 PT ___ MT

Re-billable expenses:

Equipment charges:

Client Representative: A Hebdon

NOTES:


**ACUREN 1-877-299-2857**

| | |
|---|---|
| Cambridge, ON | (519) 622-3112 • Fax (519) 622-1326 |
| Cantley, QC | (819) 360-0685 • Fax (819)-827-3513 |
| Cornwall, ON | (613) 931-1261 • Fax (613) 931-2777 |
| Gaspé, QC | (418) 392-3618 • Fax (418) 392-4114 |
| Halifax, NS | (902) 443-4448 • Fax (902) 445-5090 |
| Jonquiere, QC | (418) 542-8273 • Fax (418) 542-5494 |
| Mississauga, ON | (905) 673-9899 • Fax (905) 673-8394 |
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| Oakville, ON | (905) 825-8595 • Fax (905) 825-8598 |
| Pickering, ON | (905) 839-0015 • Fax (905) 839-5641 |
| Port Elgin, ON | (519) 389-6797 • Fax (519) 389-6799 |
| St. John's, NL | (709) 753-2100 • Fax (709) 753-7011 |
| Sarnia, ON | (519) 336-3021 • Fax (519) 336-8220 |
| Sherbrooke, QC | (819) 620-5456 • Fax (819) 346-6828 |
| Sudbury, ON | (705) 522-1849 • Fax (705) 522-9926 |
| Thunder Bay, ON | (807) 475-4240 • Fax (807) 577-2017 |
| Timmins, ON | (705) 365-8313 • Fax (705) 267-2855 |
| Val D'Or, QC | (819) 856-6789 • Fax (819) 825-9564 |

RT
SPACE

Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

# PURCHASE ORDER

**Purchase Order ID PO21040**

**Purchase Order Date** 8/22/2013
**PO Print Date** 8/22/2013



**der From :** VC-ACU002

ACUREN
2190 SPEERS ROAD
OAKVILLE, ON L6L 2X8
CA

**Ship To :** DART AEROSPACE LTD
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

**Contact Name**
**Vendor Phone** 613 931 1261

**Ship To Contact**
**Ship To Phone**
**Ship Via:**
**Ship Acct:**

**Buyer** Chantal Lavoie
**Customer POID**
**Customer Tax #** 10127-2607
**Terms** Net 30
**Currency** CAD
**FOB** Destination-Collect

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | **Line Total:** | | **$101.3** |
| 7 | 102862 | D412-664-203<br>CROSSTUBE | 8/22/2013<br>Yes<br>8/22/2013 | 1.00 | | $101.33 | $101.3 |
| | AS ABOVE | | | | | | | |
| | | | | | | **Line Total:** | | **$101.** |
| 8 | 102863 | D412-664-203<br>CROSSTUBE | 8/22/2013<br>Yes<br>8/22/2013 | 1.00 | | $101.33 | $101. |
| | AS ABOVE | | | | | | | |
| | | | | | | **Line Total:** | | **$101.** |
| 9 | 105508 | D412-596-203<br>CROSSTUBE | 8/22/2013<br>Yes<br>8/22/2013 | 1.00 | | $101.33 | $101 |

**Note:**